Patent claims

1. Antibody A directed to a leptin receptor and/or a leptin-binding protein, characterized in that it substantially reduces and preferably prevents the interaction of the leptin receptor and/or of the leptin-binding protein with a ligand.

2. Antibody A according to claim 1, characterized in that it is directed to the extracellular domain of a leptin receptor, in particular of a leptin-binding protein.

3. Antibody A according to one of claims 1 to 2, characterized in that it binds on a leptin-binding protein at the binding site for the ligand.

4. Antibody A according to one of claims 1 to 3, characterized in that the ligand is leptin.

5. Antibody A according to one of claims 1 to 4, characterized in that the leptin-binding protein is a physiological leptin-binding protein solubilized or suspended in liquid, preferably in body liquid.

6. Antibody A according to one of claims 1 to 5, characterized in that it is a monoclonal antibody.

7. Antibody A according to one of claims 1 or 6, characterized in that the antibody A is the antibody ZMC2.

8. Antibody A according to one of claims 1 to 7, characterized in that the antibody is humanized and directed to a human leptin receptor or human leptin-binding protein.

9. Antibody A according to one of claims 1 to 8, characterized in that the antibody comprises a sequence selected from any of the protein sequences selected from SEQ ID NO: 1, 2, 3, 4, 6 or 8.

10. Antibody A according to one of claims 1 to 8, characterized in that the antibody comprises a protein sequence encoded by a nucleic acid sequence selected from SEQ ID NOs: 2, 4, 5, or 7.

11. Antibody A according to one of claims 1 to 10, characterized in that the antibody is capable of blocking the peripheral actions of leptin without influencing the central actions of leptin.

12. Fragment of an antibody A according to one of claims 1 to 11, characterized in that the fragment is a $F(ab')_2$ fragment or a single-chain antibody (scFv) or a fragment of an antibody.

13. Antibody A according to one of claims 1 to 11 or a fragment of an antibody A according to claim 12 as a medicament.

14. Fusion protein, containing as portion I an antibody according to any of claims 1 to 11 or a fragment of an antibody A according to claim 12, and as portion II an antibody, an antibody fragment or a peptide, preferably leptin.

15. Fusion protein in accordance to claim 14, characterized in that the fusion protein contains a linker between portion I and portion II.

16. Fusion protein in accordance to claim 15, characterized in that the linker comprises a length of about 5 to 40 amino acids, more preferably between 5 and 30 amino acids and mostly preferred between 5 and 20 amino acids.

17. Fusion protein in accordance to claims 15 and 16, characterized in that the linker contains at least 50% glycine residues, preferably at least 60 %, more preferably at least 70% and most preferably at least 80%.

18. Fusion protein according to any of claims 14 to 17, characterized in that the fusion protein is bispecific.

19. Fusion protein according to claim 18, characterized in that the bispecific fusion protein is directed on directed to a leptin receptor and/or a leptin-binding protein as a first specificity and to a cell surface protein as a second specificity.

20. Fusion protein in accordance to any of claims 14 to 19, characterized in that the fusion protein comprises an amino acid sequence encoded by the nucleic acid sequence SEQ ID NO: 7.

21. Fusion protein in accordance any of claims 14 to 19, characterized in that the fusion protein comprises the amino acid sequence SEQ ID NO: 8.

22. Method for quantitative determination of a ligand of a binding protein/receptor in a sample containing the ligand and a leptin receptor and/or a leptin-binding protein in solubilized or suspended form, characterized in that at least one antibody A according to one of claims 1 to 11, a fragment of an antibody A according to claim 12, and/or a fusion protein according to one of claims 14 to 21 is/are be added to the sample to be determined.

23. Method according to claim 22, characterized in that at least one antibody A is added before or during, preferably before, the quantitative determination and/or is incubated with the sample.

24. Method according to one of claims 22 or 23, characterized in that the sample contains liquid, preferably body liquid, more preferably human body liquid, e.g. blood.

25. Method according to one of claims 22 to 24, characterized in that the ligand of a binding protein/receptor is a ligand of leptin-binding potein and/or leptin-receptor.

26. Method according to one of claims 22 to 25, characterized in that the leptin-binding protein is soluble, preferably a soluble portion of the leptin receptor and/or a hormone-binding protein, in particular a soluble hormone-binding protein.

27. Method according to one of claims 22 to 26, characterized in that the quantitative determination of the ligand is carried out by using the binding of the ligand as an antigen to an antibody B, preferably a monoclonal antibody B.

28. Method according to one of claims 22 to 27, characterized in that the quantitative determination is carried out by using a competitive binding test, preferably a "radio-immuno assay" (RIA).

29. Method according to one of claims 22 to 28, characterized in that the quantitative determination is carried out by the measurement of an increasing reading parameter to be increased as a function of the concentration of the ligand to be determined, preferably using an enzyme-linked immuno sorbent assay (ELISA) and/or a sandwich-assay.

30. Method according to one of claims 22 to 29, characterized in that the leptin-binding protein is not separated from the sample to be determined before quantitative determination.

31. Method according to one of claims 22 to 30, characterized in that at least one antibody A is added such, that at least one antibody A is present in the sample in a higher concentration than the leptin-binding protein, preferably in a concentration of at least 50 % more, more preferably of at least 100 %, even more preferably of at least 200 % more, and most preferably of at least 400 % more.

32. Method according to one of claims 22 to 31, characterized in that the ligand is leptin.

33. Medicament containing at least one antibody A according to one of claims 1 to 11, a fragment of an antibody according to claim 12, or a fusion protein according to one of claims 14 to 21 as well as, where appropriate, further active agents as well as further additives and/or adjuvants.

34. Diagnostic agent containing at least one antibody A according to one of claims 1 to 11, a fragment of an antibody according to claim 12, or a fusion protein according to one of claims 14 to 21 as well as, where appropriate, adjuvants.

35. Kit containing distinct from each other at least one first preparation containing at least one antibody A according to one of claims 1 to 11, a fragment of an antibody according to claim 12, or a fusion protein according to one of claims 14 to 21 and one operating test assay ready for use, based on an antigen/antibody-reaction, for quantitative determination of a ligand.

36. Kit according to claim 35, characterized in that the first preparation contains the antibody ZMC2 and/or a preparation for calibration and/or an antibody B in the operating test assay ready for use, wherein the test assay is based on an antigen/antibody-reaction for the quantitative determination of a ligand, wherein antibody B is directed to the ligand.

37. Kit according to claim 36, characterized in that the ligand is leptin and the antibody B is directed to the main isoform of leptin with a molecular weight of 16 kDa.

38. Kit according to one of claims 35 to 37, characterized in that the antibody B is a monoclonal antibody.

39. Kit according to of claim 38, characterized in that the monoclonal antibody B is directed to leptin.

40. Use of at least one antibody A according to one of claims 1 to 11, of a fragment of an antibody according to claim 12, or of a fusion protein according to one of claims 14 to 21 for determination, preferably quantitative determination, of a ligand in a physiological solution, that also contains a physiological leptin-binding protein.

41. Use of at least one antibody A according to one of claims 1 to 11, of a fragment of an antibody according to claim 12, or of a fusion protein according to one of claims 14 to 21 for preparing a medicament for the treatment of diseases, alterations or pathophysiologies, due to excessive leptin levels, alterations of the energy metabolism, in particular eating disorders, such as anorexia nervosa and cachexia as well as alterations of the immune system, in particular the undesired activation of the immune system and autoimmune diseases, selected from multiple sclerosis (MS), rheumatoide arthritis, diabetes, diabetes type I, systemic lupus erythematosus (SLE), chronic polyarthritis, Basedow's disease, autoimmune forms of chronic hepatitis, colitis ulcerosa, allergie type I-diseases, allergie type II-diseases, allergie type III-diseases, allergie type IV-diseases, fibromyalgie, alopecia, Morbus Bechterew, Morbus Crohn, Myasthenia gravis, neurodermitis, polymyalgia rheumatica, progressive systemic sclerosis (PSS), psoriasis, Reiter-

syndrome, rheumatic arthritis, vaskulitis, TH1 mediated diseases including multiple sclerosis, diabetes, type 1 diabetes, chronic heart failure (CHF), TNF-mediated diseases, autoimmune colitis, rheumatoid arthritis, systemic lupus erithematosus, and transplant rejection, for the regulation of increased proliferation of naturally occurring regulatory/suppressor T cells and treatment of diseases associated therewith, and diseases associated with the MAPK/ERK1-2, AKT, p-27-kip1 signalling pathways, for blocking immune actions of leptin or for immune therapy.

42. Use of at least one antibody according to one of claims 1 to 11, of a fragment of an antibody according to claim 12, or of a fusion protein according to one of claims 14 to 21 or of a medicament according to claim 33 for the treatment of diseases, alterations or pathophysiologies, that are due to excessive leptin levels, alterations of the energy metabolism, in particular eating disorders, such as anorexia nervosa and cachexia as well as alterations of the immune system, in particular the undesired activation of the immune system and autoimmune diseases, selected from multiple sclerosis (MS), rheumatoide arthritis, diabetes, diabetes type I, systemic lupus erythematosus (SLE), chronic polyarthritis, Basedow's disease, autoimmune forms of chronic hepatitis, colitis ulcerosa, allergie type I-diseases, allergie type II-diseases, allergie type III-diseases, allergie type IV-diseases, fibromyalgie, alopecia, Morbus Bechterew, Morbus Crohn, Myasthenia gravis, neurodermitis, polymyalgia rheumatica, progressive systemic sclerosis (PSS), psoriasis, Reiter-syndrome, rheumatic arthritis, vaskulitis, TH1 mediated diseases including multiple sclerosis, diabetes, type 1 diabetes, chronic heart failure (CHF), TNF-mediated diseases, autoimmune colitis, rheumatoid arthritis, systemic lupus erithematosus, and transplant rejection, for the regulation of increased proliferation of naturally occurring regulatory/suppressor T cells and treatment of diseases associated therewith, and diseases associated with the MAPK/ERK1-2, AKT, p-27-kip1 signalling pathways, for blocking immune actions of leptin or for immune therapy.